

curve, but the values of the products of the protein metabolism generally will be found altered.

In other words, the fairly constant impaired glucose curve, observed in cases of eczema by Doctor Ayres, should be interpreted in the light of a symptom only, the cause of which must be sought for in every case to enable us to proceed with judicious treatment. That, in turn, implies a comprehensive knowledge of, and skill in, the theory and practice of internal medicine.

DOCTOR AYRES (closing)—I appreciate very much the generous remarks and the valuable suggestions which have been offered in the foregoing discussions. I have merely tried to call attention to the role of the carbohydrates in the problem of eczema.

Carbohydrate metabolism, on the other hand, is intimately linked with other vital functions upon which detailed observation and research must be focussed before the riddle can be solved.

With all due respect to the splendid work which Piness has done in the field of allergic phenomena, I cannot subscribe unreservedly to his statement that "it is an accepted fact that eczema is an allergic reaction."

Some eczemas are allergic reactions, just as some headaches may be allergic reactions, but it would be inadvisable to admit of no other causes. The eczemas on the hands of dishwashers and the eczemas due to various other external irritants are certainly not of the protein sensitive type. On the other hand it would seem quite reasonable that there may be an associated disturbance of both protein and carbohydrate metabolism in some of the eczemas. I would be the last to say that many of my cases did not fall in this category. But, again, I do not believe it has been proved that protein sensitization is an ultimate cause. Certain facts point to allergic reactions as symptoms of more fundamental disturbances, just as in the case of decreased carbohydrate tolerance, and the real solution of the problem lies in the discovery and correction of that primary disorder. Breed's observation on liver function seem to me to offer extremely interesting possibilities.

Again let me emphasize the fact that I am not urging carbohydrate intolerance as the cause of all eczemas; it is only a small but very important factor.

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**Oxygen Want in Health and Disease**—Charles W. Greene, Columbia, Mo. (Journal A. M. A.), discusses the oxygen capacity of the blood; normal alveolar oxygen pressures; the physiology of high alveolar oxygen pressures; the physiology of low alveolar oxygen pressures; the anoxemic crisis; the significance and danger of the asphyxial post-crisis events; the remedy for anoxemia—an artificial oxygen supply; oxygen want in anesthesia; oxygen availability in disease; the oxygen problem in cardiac deficits, and the anemias. He concludes that the administration of oxygen has no advantage to the normal body. Airs of more than 60 per cent of oxygen may produce pulmonary inflammation by local action. Oxygen administration has no physiologic clinical advantage in hemorrhage, anemia, or other circulatory mechanical defects. Oxygen-enriched airs are of life-saving value in all clinical cases of pulmonary obstruction, edemas or other deficiencies that retard the process of oxygen absorption or prevent the full saturation of the hemoglobin of the pulmonary blood. Oxygen administration must be controlled by recognized physiologic methods, must be continual, and must not produce local pulmonary injury. Oxygen administration cannot be successfully pursued except with clear understanding of the type of response to anoxemia and the recoveries on re-oxygenation through the complex and interdependent reactions of the nervous system, the respiratory system, the circulatory system, and the blood. For all these we have in present-day methods and animal verification an accurate scientific basis of determination.

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A doctor's widow is looking for a job because her husband lost his savings in a malpractice suit just before he died. Whatever else you do, doctor, protect your wife and children from disasters inherent in the hazards of your profession.

## THE USE OF WHOLE LACTIC ACID MILK IN PRIVATE PRACTICE

By JAMES W. CHAPMAN, M. D., Pasadena

*Lactic acid milk changes the bacterial flora of the intestine only to a slight extent and this change is not essential for its beneficial action.*

*Milk, soured by addition of U. S. P. Lactic Acid in the proper amount, seems to have an effect practically the same as that soured by organisms.*

*The chief advantage of whole lactic acid milk lies in the fact that it is a concentrated food and can be fed to athreptic infants and other below-weight infants, whose tolerance for fat and sugar has been lowered, in sufficient amounts to bring about a gain without causing an intestinal disturbance.*

*Whole lactic acid milk is not a panacea. I do not believe its use is indicated in normal infants. We have found it to be of greatest value in the feeding of the so-called athreptic infant, although, in some intestinal upsets, its value is unquestioned.*

DISCUSSION by T. C. McCleave, Oakland; Paul S. Barrett, Fresno.

NO NEW facts are presented in this paper. It was written because we thought it might be of more or less general interest to relate some experiences with the use of whole lactic acid milk in private practice, where conditions are vastly different from those found in hospitals and institutions where most of the work with soured milk formulae has been done.

At the outset it might be of some interest to describe briefly the historical background of soured milk and its use as an article of diet. It has been used extensively among all peoples and in all climes for untold centuries. As a food for infants and invalids it has been used by the Armenians and other Near Eastern peoples quite as long as the well-known matzoon.

Metchnikoff attributed the sturdy health and longevity of certain of the Balkan peoples to their extensive use of soured milk as food. His observations and investigations gave a tremendous impetus to the use of soured milk and to the souring agency, the so-called *B. bulgaricus*. Metchnikoff attributed the beneficial result following the use of sour milk to the organisms souring the milk, stating that they brought about a change in the bacterial flora of the intestine. For many years soured milk and the various organisms capable of souring milk were given for no other purpose than to bring about a change in the bacterial flora of the intestine. Beneficial results were explained on such a basis. First, *B. bulgaricus* held the limelight and Bulgarian tablets were prescribed at the least provocation; later, *B. lactic acid* and *B. acidophilus* became the organisms of choice for one reason or another, based on not very convincing experimental work.

That there seemed at first glance very good reason to suspect intestinal bacteria of causing many of the diarrheas of infancy and childhood, may be seen when stools are examined during an intestinal upset. Often pure cultures of one organism are found, the commonest perhaps being *B. coli*, *B. welchii*, *streptococcus faecalis*, *B. pyococcyaneus*, and *B. proteus*, and to each one at some time or other has been ascribed the causation of diarrheas in infants.

The result of most of the work done in recent years on the subject of the role of bacteria in the

etiology of diarrheas in infancy, excluding, of course, the dysentery group, has been, I believe, overwhelmingly against the opinion that they have much to do with it. Their presence in more or less pure culture seems to be rather an effect than a cause. The intestinal mucosa, damaged by too much or improper food, seems to be unable to exert its normal inhibitory power over the growth of these organisms.

Veeder some years ago worked on the problem, and his conclusions were that bacteria had very little to do with the vast majority of diarrheas and intestinal upsets occurring in infancy. Howland and Marriott seemed to hold the same views. The work of Davison and Rosenthal seems also to belittle the role of bacteria in causation of diarrheas in infancy. A report of work done by investigators in various parts of England on the bacteriology of normal and diarrheal stools in children is perhaps most convincing. These investigators were unable to find evidence that bacteria usually found in normal intestines are ever the cause of diarrheas in infancy and childhood. It would seem, therefore, that we must conclude that, while it is conceivable that the bacterial flora of the intestine might play a part in the etiology of diarrheas in infancy and childhood, it has never been proved that they do.

If bacteria have nothing to do with the etiology of the majority of the diarrheas of infancy and childhood, we must discard Metchnikoff's theory and look about for some other explanation for the beneficial results following the use of soured milk. In 1902 the *Jahr buch für Kinderheilkunde* carried a report of the use of acidified milk in infant-feeding. In 1909 M. Klotz, in the same journal, reported that acidified milk had a favorable effect on fat protein and mineral absorption. We do not see reports in the literature of acidified milk being used again in infant-feeding until 1918, when Marriott called attention to its advantages.

Marriott was engaged at the time in investigating the reasons why an infant's tolerance for cow's milk was less than for woman's milk. He concluded that the reason was that the cow's milk was so much richer in buffer substances. These buffer substances required so much acid to neutralize them that the acidity of the gastric juice was lowered to a point where it did not properly function. He thought that if cow's milk were acidified, much more could be given at a time without causing a gastro-intestinal upset, because the buffer substances would be to some extent rendered inert before entering the stomach, and the acidity of the gastric juice would not be changed to any great extent.

The initial process of digestion in the infant's stomach depends on the HCl secreted by the gastric glands. Normally, the amount secreted is optimum for the digestion of breast milk. Breast milk, compared with cow's milk, is highly acid, that is, it has a comparatively high  $P_h$  index—about three times as high as cow's milk. Theoretically, at least acidifying cow's milk, with an amount of acid that would bring the  $P_h$  index up near that of breast milk, would be a great aid to the digestion and assimilation of cow's milk.

With these ideas as his guiding principles, Marriott began working with cow's milk, soured by incubating in it a pure culture of *B lactic acid* aero-

genes. To make up the difference in the carbohydrate content between cow's milk and breast milk and so increase caloric value, cane sugar or the dextrin maltose was used. Later, karo was used almost exclusively. Karo syrup was used for the reason that, being a mixture of several sugars, it should be ideal for the purpose, containing, as it does, dextrin 55 per cent, maltose 30 per cent, and glucose 15 per cent. The readily absorbed and difficultly fermentable dextrin and glucose is nicely balanced against the easily fermentable maltose, making a mixture that is not conducive to diarrhea; in fact, surprisingly large amounts may be given without getting into difficulty.

*The Mixture Described*—Cow's milk, soured by incubating in it bacteria and an easily assimilable carbohydrate, has a  $P_h$  index very nearly approaching that of breast milk and a caloric value per ounce equal to that of breast milk. The results obtained from the use of the mixture in the St. Louis Children's Hospital and the Washington University showed very conclusively that it was of great value, if not in all feeding cases, certainly in those most difficult of all the atreptic type.

After leaving the hospital and attempting to use cow's milk soured bacterially, all manner of difficulties were encountered. The question of which bacteria to use in souring the milk was a big one. Contamination and death of the cultures, through lack of proper facilities for handling, occurred frequently. The age, purity and viability of commercial cultures varied, and consequent variations in acidity resulted. Often the expense of cultures or of milk soured commercially was an item to be considered. In many homes the cultures could not be handled properly, the question of temperature and contamination being too much for the average mother. The acidity of the milk was never above suspicion. It seemed to me that unless the acidity of the milk is more or less constant, much of its benefit is lost. Frequently enough to keep up our interest, milk could be soured in the home under conditions which made it dependable, and in these instances the results were uniformly good. On the whole, however, the use of milk soured bacterially outside hospitals seemed to me very unsatisfactory. Influenced by others who claimed to have obtained good results from their use, alleged pure cultures of bacteria in various forms—liquid, jelly, and tablets—were used, but no good results were obtained that could be attributed to the cultures. As a matter of fact, none could be expected from their use because acid must be present in cow's milk prior to introduction into the infant's stomach if we expect to reduce the content of buffer substances in cow's milk and so protect the acidity of the gastric juice.

The acid content of milk soured in commercial laboratories is rarely ever above suspicion. It is, of course, possible to obtain milk soured in commercial laboratories, but so far we have no evidence that convinces us that they can be used to accomplish our purpose. One seldom finds in such laboratories workers who really get the clinician's point of view. Most of them stress the point that their product changes the bacterial flora in the intestine, but, as has been pointed out, we do not believe this

to be of much importance in dealing with intestinal upsets of children. Bacterially, soured milk will vary in acidity between wide limits according to the bacteria used. To produce a milk soured bacterially, in which the acidity is proper and constant day after day, requires a scrupulous attention to detail, which is beyond most commercial laboratories. Most of the commercial soured milk has an exceedingly sour taste which often results in the infant's refusing to take the milk, and in some instances this has been known to prejudice a certain type of mother against the milk, which naturally complicates matters.

In the face of such difficulties, we came to the conclusion that lactic acid milk, as produced by incubating in it certain bacteria, could not be used as extensively as it should in private practice. Some diarrheas could be controlled with protein milk, and the infant could be made to gain for a time by adding carbohydrate and a little fat, but this scheme had its limitations and we were soon forced back to a sweet milk formula. In certain types of cases as soon as a sweet milk formula was given, a stationary weight resulted, and if then enough carbohydrates and fat were added to bring about a gain in weight, greasy stools returned.

The so-called athreptic infants presented, and for that matter do now present, the greatest problem. All pediatricists are only too familiar with the infant who will not gain unless given an amount of food which, even if continued a short time, will bring about an intestinal upset. An infant, in other words, who requires more food in order to gain weight than it can assimilate without going beyond the limits of its tolerance. We felt that if these infants could be given whole lactic acid milk, they would all gain weight and their tolerance to fat and sugar could be increased.

It was suggested to me by J. F. Perkins of Dallas, Texas, who, under Marriott at St. Louis, had been a pioneer in the use of whole lactic acid milk, that U. S. P. lactic acid could be added to sweet milk and used exactly as bacterially soured lactic acid milk was used. This idea came to him from Marriott, who, as a result of some work on the acidity of the contents of an infant's stomach, came to the conclusion that the acid was the important factor in sour milk—not the souring agents.

In the choice of an acid to use in souring milk, Marriott was governed by several considerations. Hydrochloric acid, since it is already present in the stomach and is the very acid we wish to protect by acidifying the milk, suggested itself first. It is, however, an inorganic acid and must be neutralized and excreted and might in time become a burden to the body—might even result in acidosis by depleting the body bases. Other organic acids, such as acetic, citric, and butyric, tend to cause diarrhea. Lactic acid seemed most free from disadvantages. Several of the acids named have been used by other investigators, namely, hydrochloric acid by Faber, and citric acid by Hess, and their reports have been favorable, and it may well be that further investigation may show them to be the acids of choice. In the light of the evidence we now have, we believe that lactic acid is the safest, being completely oxidized, requiring no neutralization in the

body, and in the amount necessary to raise the  $P_h$  index of cow's milk to the proper point, exerting no harmful effect on the gastric intestinal tract.

The method of souring milk with U. S. P. lactic acid follows very closely that suggested by Marriott. If certified milk is used, no sterilization is deemed necessary, but if ordinary raw milk is used it is boiled five minutes. While boiling, the milk is stirred to prevent the formation of a scum. If such a scum does form, it is removed before the acid is added. After boiling, the milk is allowed to cool, because if acid is added while milk is too warm it will clot in large curds, which will interfere with its passage through the nipple.

U. S. P. lactic acid is used 4 cc. to each 500 cc. of milk, or approximately sixty drops to each pint. The acid is added slowly, one drop at a time, with a medicine dropper. While the acid is being added, the milk should be stirred gently. It is important that the milk be cool, that the acid be added slowly, and that the milk be stirred while adding acid, otherwise large curds will appear. Such curds do not render the milk unfit for use, but they do clog the nipple holes. Vigorous shaking will usually break them up.

If properly made, the mixture should be smooth and homogeneous, and should have the taste and odor of ordinary buttermilk. The exceedingly sour taste of most bacterially soured milk is absent. The  $P_h$  index is about that of breast milk,  $P_h 4$ . Carbohydrate is added to suit the needs of the individual infant—usually about 2 or 3 per cent. Karo corn syrup, dextri maltose, and cane sugar have been used—the two first named most frequently and about equally; the latter only when the others seemed not to be well tolerated. Milk sugar is never used because, not having a sweet taste, the sourness of the milk is not decreased, and also because it probably is not assimilated to the degree that the other sugars named are. The amounts of carbohydrates varied, of course, with the individual's needs and tolerance. In some infants badly undernourished, surprisingly large amounts may be given without harmful results. As a rule, however, we rarely give as much as the usual 3 per cent, finding usually that a satisfactory gain can be brought about with a small amount of sugar. The sugar is always dissolved in warm water before it is mixed with the milk; this facilitates mixing. If the infant is taking cereal, very little or no other carbohydrate is given unless the infant is badly undernourished.

All directions for preparation of lactic acid milk are written in detail, and we convince ourselves that the mother or nurse understands the reason why the acid is added before any attempt is made to prepare the formulae. Usually the lactic acid is not diluted, for the reason that the amount the infant would ordinarily take does not seem to be in excess of his ability to digest it. Never more than a quart is given in twenty-four hours. We believe that if more calories than are represented by one quart of milk, with additional carbohydrates, are required to bring about a gain, other food in the shape of cereals, soups, etc., are indicated.

It is not to be understood that whole lactic acid milk is used wherever and whenever lactic acid milk seems to be indicated. In severe diarrheas or

in cases where infants seem to have had their tolerance for fat or carbohydrate greatly decreased, skimmed milk with no sugar added is used—the fat and carbohydrate being added as conditions permit. In such cases where there seems to be an unusually low tolerance for carbohydrate, corn starch is often used, as it seems to be more easily borne than other forms of carbohydrate; usually a 3 per cent solution is used, although we have used it up to 6 per cent, which is rather thick.

It has been our experience that no infant will for long refuse lactic acid milk. Often it is refused at first, but if persistently offered it will be taken quite as eagerly as any other food. A certain type of mother, familiar to all, often is greatly alarmed at the infant's refusal to take the milk, but after being assured, sometimes repeatedly, that the baby will finally take the food, she goes on with it.

We have given lactic acid milk, with few exceptions, to abnormal feeding cases only; that is, to infants suffering from acute or chronic gastro-intestinal disturbances. It has always seemed to me that the simpler a formula could be made, the better for everyone concerned—the infant, the mother or nurse, and the pediatrician; infants showing a steady satisfactory gain on a sweet milk formula are left alone. As a matter of fact, we have noted in several instances where normal infants were given lactic acid milk colic was more frequent than when sweet milk formulae were given, the colic usually being relieved when a change to sweet milk was made. It may well be that the colic was due to some other factor or factors other than lactic acid. We have not sufficient data to say positively; the above is an impression only.

After acute intestinal upsets in which protein milk has been used, in changing from protein milk to sweet milk, a lactic acid formula is valuable. We have had less trouble when it has been used between protein milk and sweet milk than when the change was attempted without it. In some cases, where it seemed indicated, we have used a formula suggested by John Howland and called by him "Reinforced Protein Milk," which is made by adding the curd from a quart of sweet milk to a quart of lactic acid milk made from skimmed milk. With his formula, carbohydrates are necessary—if not at first, at least within a few days, if a weight loss is to be avoided.

Lactic acid milk, made by souring whole milk or skimmed milk with U. S. P. lactic acid, has been used by us in approximately 50 per cent of the abnormal feeding cases seen in the past year. A number of normal infants were given lactic acid milk; some were fed lactic acid milk, so that we might use them as controls; others because lactic acid milk seemed safest because of their geographical location, lack of facilities for cooling milk, and for other like reasons. In a few of the normal infants fed lactic acid milk, colic, or what seemed from the descriptions to be colic, developed. In no case was it accompanied by a gastro-intestinal upset, and in every case a return to a sweet milk formula stopped the symptoms promptly. We have considered here only the cases in which lactic acid milk seemed definitely indicated. These number fifty-one. Thirty-two are from our private practice, and nineteen are from

two clinics. The cases from the clinics were included because the milk in every case was prepared at home with no personal supervision. A number of other infants were given lactic acid milk, but they are not included because they were seen so few times or so irregularly that the results have no meaning. In only one instance do we know definitely that a diarrhea developed while lactic acid milk was being given, and in this case, in our absence, the infant came under the care of another pediatricist who changed the formula.

	No.	Average Age	Average length of time on W. L. A. M.	Average Weekly Gain
Private cases.....	32	5½ mos.	42 days	8¼ oz.
Clinic cases.....	19	4 mos.	45 days	7½ oz.

Two cases are described in detail:

CASE 1. Baby L.; age 3½ months. Birth weight, 7¼ pounds; breast fed, two months; then Eagle Brand for two weeks; stools became loose, green with mucus and curds; changed to Mellin's Food; stools improved but did not gain. One month ago changed to cow's milk formula but has not gained; each time formula strengthened an intestinal upset followed; now at 4½ months the weight is 9¼ pounds; has three or four greenish, yellow stools a day which contain mucus and protein curds. Because of the clear evidence of lowered tolerance for fat and sugar, skimmed milk acidified and diluted with plain boiled water was given. The first week no gain was recorded, but neither was there a loss; the stools improved, became yellow, smooth and pasty, whereupon whole milk was used but no carbohydrates. The next report, made one week later, showed a gain of 6 ounces. One per cent carbohydrate in the form of Karo was added and the next week a gain of 13 ounces was recorded. The next week the mother reported baby constipated. Carbohydrate was increased to 3 per cent and prune juice was advised. April 3 the weight was 10 pounds 8 ounces. Approximately one month later, May 1, the weight was 13 pounds. June 5, the weight was 15 pounds 5 ounces; July 10, the weight was 16½ pounds. The baby at this time was 7 months old. Lactic acid was discontinued and a diluted sweet milk formula given with soups and cereal. No intestinal disturbances were recorded after lactic acid milk was given except the light tendency toward constipation at first, which was overcome by more carbohydrate and prune juice. At one year the baby weighed 20 pounds 15 ounces, and measured twenty-nine inches in length.

CASE 2. Baby K. B. S.; age 4½ months. Birth weight, 8 pounds 1½ ounces; present weight, 10 pounds 6 ounces; was on breast for one month; did well; changed to four-hour schedule and then weaned in a short time because milk supply seemed to be failing; since has lost weight. Has been on Mellin's Food, Eagle Brand, Mrs. Alberty's food and modified cow's milk formula; did not improve on any; constipated since he has been on cow's milk; before on proprietary foods stools always watery, green; cried a great deal. Examination revealed nothing of importance except very thin, emaciated infant and certain degree of anhydremia-turgor being slightly reduced. Put on W. L. A. M. formula of 32 ounces: Six and one-half ounces five times a day, 3 per cent carbohydrate. In week following, infant gained 12 ounces; in next two weeks gained 27 ounces. In the 2½ months he remained on the lactic acid formula he gained a total of 5 pounds 9 ounces. Lactic acid was discontinued and the baby put on sweet milk formula with cereal gruel and soup. At 8½ months his weight was 19 pounds 6 ounces.

These two cases are typical. Other cases might be detailed in which most astounding gains appear. In one which occurs to us there was a gain of 18 ounces in one week and with no evidence of nutri-

tional edema and no intestinal disturbance, but such cases are not as typical as the two detailed are.

#### SUMMARY

1. Lactic acid used in infant-feeding seems to make its first appearance in the literature in 1902. In 1904 another report appears in which it was claimed that the addition of lactic acid to the food of infants resulted in distinctly better assimilation of all food elements from the gastro-intestinal tract.

2. Marriott, in 1918, after working with cow's milk in which lactic acid-producing organisms had been incubated, came to the conclusion that the acid, by removing the excess of buffer substances in cow's milk, rendered it easier of digestion.

3. Lactic acid milk changes the bacterial flora of the intestine only to a slight extent, and this change is not essential for its beneficial action.

It is almost impossible to successfully use bacterially soured milk in private practice except in a few cases in which conditions were exactly favorable. Milk soured by addition of U. S. P. lactic acid in the proper amount seems to have an effect practically the same as that soured by organisms. Lactic acid seems preferable to HCl and other inorganic acids, for the reason that it does not require neutralization in the body and can be almost completely oxidized in the body. There is the danger in the use of inorganic acids that they might, if used over a long period of time, deplete the bases of the body to the extent that an acidosis results.

The chief advantage of whole lactic acid milk lies in the fact that it is a concentrated food and can be fed to athreptic infants and other below-weight infants whose tolerance for fat and sugar has been lowered in sufficient amounts to bring about a gain without causing an intestinal disturbance.

Whole lactic acid milk is not a panacea. I do not believe its use is indicated in normal infants. We have found it to be of greatest value in the feeding of the so-called athreptic infant, although in some intestinal upsets its value is unquestioned.

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#### DISCUSSION

T. C. McCLEAVE, M. D. (Medical Building, Oakland).—Sour milk preparations are very widely used in the dietary of many different peoples and have had ascribed to them, by certain medical writers, nutritive properties not found in fresh milks. The Metchnikoff propaganda for soured milks attracted general attention because of his authoritative position as a bacteriologist, although his views on the subject were soon shown to be extravagant.

He believed the beneficial effect of soured milks to be due to the contained *B. bulgaricus*, and, as the sour taste is objectionable to many persons, pure cultures of this organism were often given, instead of the milk, in digestive disturbances considered suitable for treatment by this means. Later, *B. acidophilus* became the popular organism, largely displacing *B. bulgaricus*.

As stated in the paper, however, the work of Howland and Marriott and their associates appeared to show that the presence of any particular organisms in the digestive tract was not the important factor, but that to the high lactic acid content of the milk was due the benefits which, undeniably, follow its use in certain dyspepsias of infants and young children at least, and the difficulties encountered in the preparation of soured milks, by the addition of bacterial cultures, have been obviated

by the simple addition of suitable amounts of lactic acid, or, less commonly used, hydrochloric acid.

There can be no question that milk thus acidified is very valuable in certain feeding cases which do badly on ordinary milks. The taste is objectionable, however, and mothers are loth to feed it, but, fortunately, although cow's milk is rich in buffer substances, most healthy babies can digest it perfectly well when suitably modified and boiled, and acid milks are not generally necessary.

PAUL S. BARRETT, M. D. (Bank of Italy Building, Fresno, California).—For a considerable period of time the technical difficulties in the preparation of fermented or acid milk formulæ made them suitable only for use in institutions. With the change to the simple addition of lactic acid, however, the home preparation no longer presents a difficulty, providing the instructions are followed. It is my custom to boil all milk used and instruct the mother not to add the lactic acid until the milk is thoroughly cooled. Then, by adding the lactic acid drop by drop, stirring with a glass rod, a smooth, non-curdled mixture is obtained. It is also important not to heat the food above 100 degrees F. before a feeding, in order to avoid curdling.

Occasionally, in feeding a mixture according to Marriott's formula of a dram to a pint, the mother reports that the child vomits after every feeding. It is often advisable to decrease the acid content for a few days and then gradually increase it again.

It has been generally proven that lactic acid facilitates the digestion of fats but not the sugars. Experience shows, however, that it is possible to bring the carbohydrate up to a higher per cent than has heretofore been practical.

Recently, I have been using the lemon juice milk as advocated by Hess of New York with similar results; both mixtures, with their added carbohydrate, being perfectly palatable to most infants. The mothers, almost without exception, become interested in the procedure, and, after a few weeks' trial, become enthusiastic over the "sour milk feeding."

Finally, I wish to thank Doctor Chapman for bringing the attention of physicians to a method of feeding, which, while not a panacea, is certainly another valuable addition to the management of the so-called difficult feeder.

DOCTOR CHAPMAN (closing).—It has not been my experience that infants will long refuse milk acidified with U. S. P. lactic acid. Such a difficulty was common with the use of bacterially soured milk. I explain to the mother exactly why the acid is added and what to expect from its use. I have encountered practically none who objected to its use.

It has been shown quite conclusively, I believe, that very often, when an infant's tolerance for fat has been lowered, the tolerance for sugar is lowered to some extent, and, when the tolerance for fat is raised, more carbohydrate may be taken. I do not believe that citric acid will prove to be as satisfactory as lactic acid in infant feeding for the reason that the acidity of lemon juice varies, and danger of a gastro-intestinal upset is greater than in lactic acid milk.

I would like to say, finally, that, while I do not believe that soured milk will displace the simpler formula of cow's milk, water and carbohydrate, I do believe that it has a very definite place in the armamentarium of the physician who feeds infants. It is, perhaps, the most valuable addition to infant feeding since Finkelstein's "Eweiss" milk was introduced. With the proper use of w. l. a. m. and protein milk, there are practically no feeding cases that cannot be successfully handled.

The fact is that, while babies born today have many times more chance of living to maturity than they did twenty-five years ago, the person of 35 today needs help to keep as many years ahead of him as had his grandfather when he was 35 years old. The failure is that of the individual—not of medical science or physicians. Today man has everything but himself working in his favor for health and longevity.—William G. Exton, M. D.

Well, well, old fellow, you look half dead. Why don't you take a vacation, or *have* you?